Studies on Olividae. XI. *Oliva chrysoplecta*, sp.n., a familiar, undescribed Western Pacific species.

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ABSTRACT. *Oliva esiodina* Petuch and Sargent,1986 (non Duclos, 1844) and *Oliva lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850) are intergrading variants of the same species for which the name *Oliva chrysoplecta*, sp.n. is proposed.

RESUME. *Oliva esiodina* Petuch and Sargent,1986 (non Duclos, 1844) et *Oliva lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850) désignent des variations (reliées par des intergrades) d'une même espèce, pour laquelle le nom *Oliva chrysoplecta*, sp.n. est proposé.

KEYWORDS. Mollusca, Gastropoda, Olividae, *Oliva*, *esiodina*, *lentiginosa*, *chrysoplecta*.

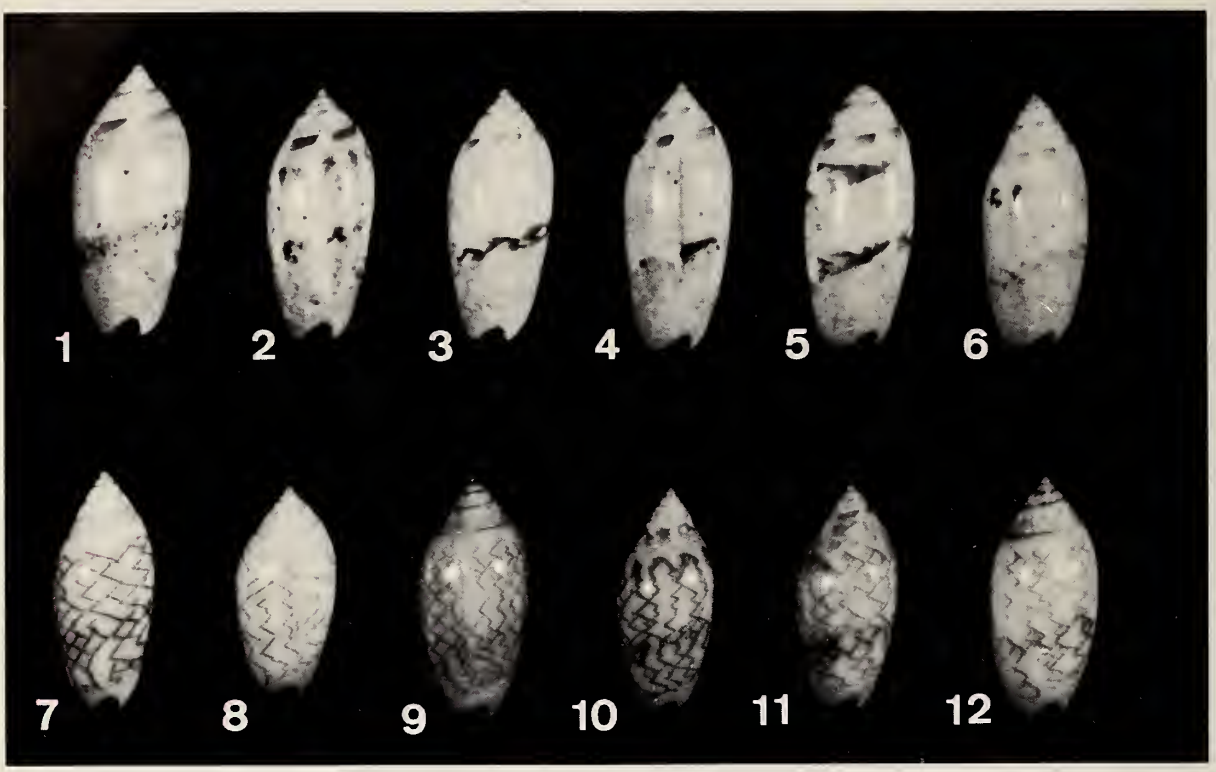
MOTS-CLEFS. Mollusques, Gastéropodes, Olividae, *Oliva*, *esiodina*, *lentiginosa*, *chrysoplecta*..

I. INTRODUCTION.

In the latest revision of the genus *Oliva*, PETUCH & SARGENT (1986) report two small Western Pacific shells as *Oliva (Acutoliva) lentiginosa* Reeve, 1850 (p.62, Plate 1, figs. 7,8) and *Oliva (Acutoliva) esiodina* Duclos, 1835 (*sic*) (p.60, Plate 1, figs. 15,16) respectively.

This raises several problems as these shells (at first sight vaguely reminiscent of the "*O. panniculata*" group) bear little resemblance to the type specimens of these taxa. In addition, TURSCH & GREIFENEDER (1989) recently showed that *O. lentiginosa* Reeve, 1850 (and *O. duclosi* Reeve, 1850) are junior synonyms of *O. esiodina* Duclos, 1844.

Two rather homogeneous series of shells matching PETUCH and SARGENT's descriptions are illustrated in Figures 1 and 2. The elucidation of their identity is the object of the present paper.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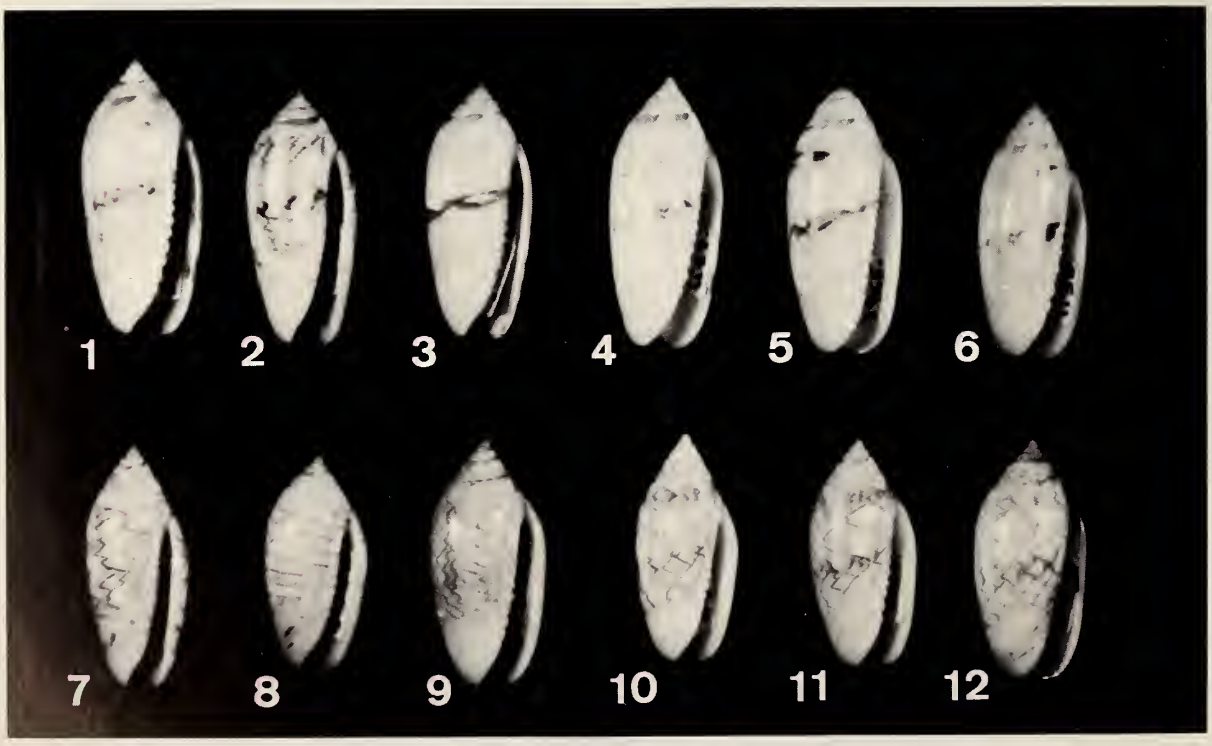
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Figure 1. *Oliva chrysoplecta* sp.n. (dorsal view).
1: specimen RF-0011; 2: specimen RF-0012; 3: specimen DG-4826; 4: specimen BT-1157 (paratype 3); 5: specimen BT-1965; 6: specimen BT-1158; 7: specimen BT-5511 (paratype 5); 8: specimen BT-4340; 9: specimen BT-5510; 10: specimen DG-1780 (paratype 4); 11: specimen BT-1160 (paratype 1); 12: specimen BT-1159 (paratype 2).
Shells 1 to 6 are of the colour variant *O. lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850).
Shells 7 to 12 are of the colour variant *O. esiodina* Petuch and Sargent,1986 (non Duclos, 1844)

Figure 2. *Oliva chrysoplecta* sp.n. (ventral view).
1: specimen RF-0011; 2: specimen RF-0012; 3: specimen DG-4826; 4: specimen BT-1157 (paratype 3); 5: specimen BT-1965; 6: specimen BT-1158; 7: specimen BT-5511 (paratype 5); 8: specimen BT-4340; 9: specimen BT-5510; 10: specimen DG-1780 (paratype 4); 11: specimen BT-1160 (paratype 1); 12: specimen BT-1159 (paratype 2).
Shells 1 to 6 are of the colour variant *O. lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850).
Shells 7 to 12 are of the colour variant *O. esiodina* Petuch and Sargent,1986 (non Duclos, 1844)

2. HISTORY.

One shell type is described p.60 and illustrated Pl.1, figs. 15 and 16 in PETUCH & SARGENT (1986) under the name *Oliva (Acutoliva) esiodina* Duclos, 1835. "Description: Shell cream-yellow overlaid with reddish bordered triangles, which form a loose netted pattern. Discussion: This species was considered by some workers to be a subspecies of *O. duclosi*. The consistently distinctive characteristics have prompted us to place *O. esiodina* as a full distinct species as was intended by its original author. The species is endemic to the central Philippines and is found in shallow water. Size : 15 mm to 25 mm in length".

The other shell type is described p.62 and illustrated Pl.1, figs. 7 and 8 in PETUCH & SARGENT (1986) under the name *Oliva (Acutoliva) lentiginosa* Reeve, 1850. "Description: Shell white, overlaid with a very faint network of fine purple triangles; band around mid-body composed of darker purple triangles; overall white or light colored shell. Discussion: Restricted to the Western Pacific, from the Philippines to the Ruykyu Islands, in shallow water. Size : 25 mm to 30 mm in length".

3. METHOD.

We intend to:

1. Establish whether both shells are different from *esiodina* Duclos, 1844 (= *lentiginosa* Reeve, 1850 = *duclosi* Reeve, 1850) or not.

2. If not, compare them with other "related" shells and determine their discriminant characters, if any.

Numerical data will be utilized whenever possible.

4. MEASUREMENTS.

The shell measurements nw, pnw, spro, mpro, lpro, H, L, LW, D, X, R, sut, F and FG have been decribed in detail in TURSCH & GERMAIN (1985), res4 and res5 in TURSCH & GERMAIN (1986), pat14, pat16, pat17 and pat18 in TURSCH & GERMAIN (1987).

For a quick reminder, nw is the number of volutions of the protoconch and pnw is the number of postnuclear whorls. Both can be measured within O.O5 whorl. The meaning of the other measurements is summarily sketched in Fig.3.

5. RESULTS.

5.1. Apparent intergradation.

Our first task was to prepare study series of *Oliva (Acutoliva) esiodina* Petuch and Sargent,1986 (? non Duclos, 1844) (hereafter called "*ePS*" for the sake of brevity) and *Oliva (Acutoliva) lentiginosa* Petuch and Sargent,1986 (? non Reeve, 1850) (hereafter called "*lPS*"). Although homogeneous series (such as depicted in Figures 1 and 2) at first suggested the existence of two sharply separate taxa we were soon faced with several specimens (see for instance Figure 4) of problematic membership . While in doubt, these were at first treated as a hypothetical, distinct group, hereafter refered to as "*xPS*".

5.2. Comparison with *O. esiodina* Duclos.

Morphometric methods readily establish that "*ePS*", "*lPS*" and "*xPS*" (see paragraph 5.1) are quite different from *O. esiodina* Duclos, 1844 (= *O. lentiginosa* Reeve, 1850; = O. *duclosi* Reeve, 1850, see TURSCH & GREIFENEDER, 1989). An example of clear-cut separation is given in Figure 6. From now on we can safely designate the shells decribed by PETUCH and SARGENT by the names *Oliva esiodina* Petuch and Sargent,1986 (non Duclos, 1844) and *Oliva lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850) respectively.

Remarks :

a. The misidentification of PETUCH and SARGENT (1986) might be due to the fact that certain (atypical) specimens such as specimen DG-4819 (illustrated in Figure 4) have a pattern vaguely reminiscent of *O. esiodina* Duclos (illustrated in KAICHER, 1988 and in TURSCH & GREIFENEDER, 1989).

b. In the computer-assisted search for discriminants between *O. esiodina* Duclos and the phena "*ePS*", "*lPS*" and "*xPS*" we could not escape noticing that no objective separation was achieved between the three latter groups.

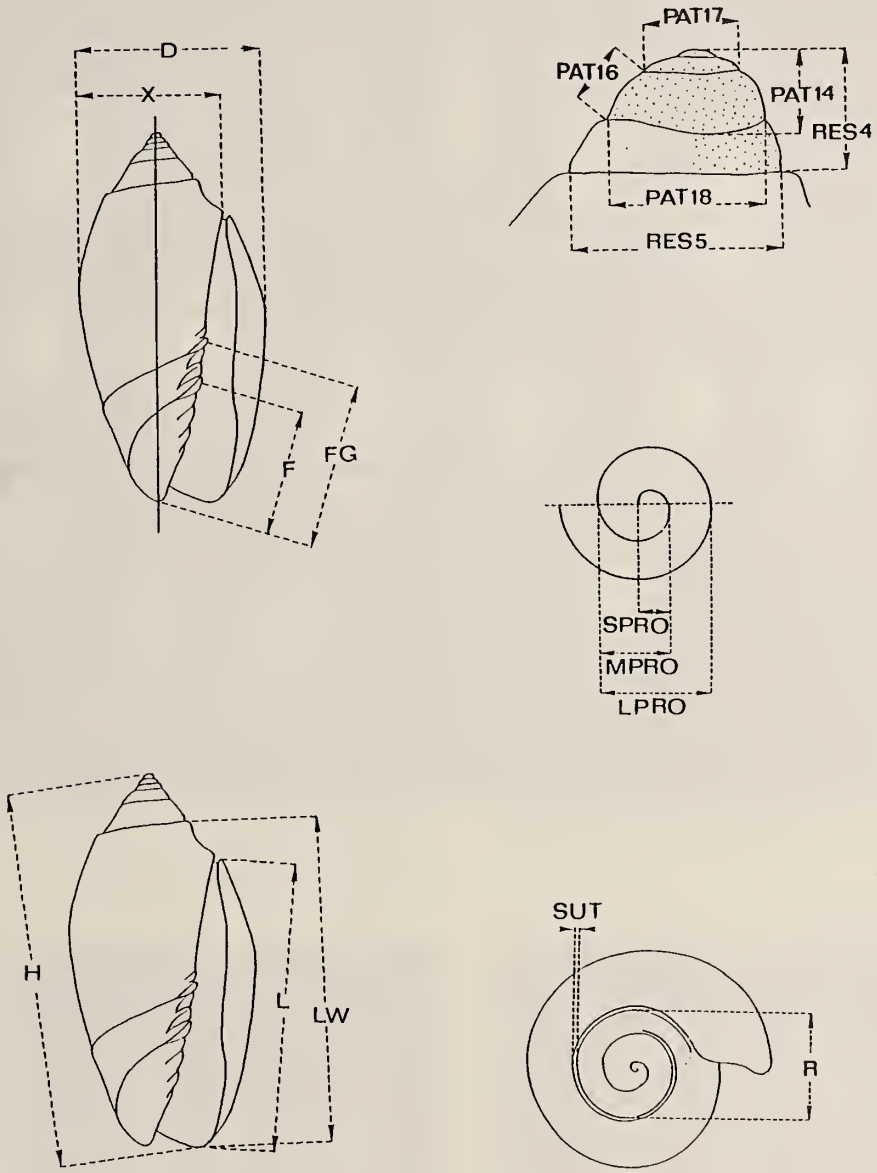


Figure 3. Sketch of measurements used in this work.

Figure 4 (opposite page). *Oliva chrysoplecta* sp.n.: pattern intergradation of colour variant *O. esiodina* Petuch and Sargent,1986 (non Duclos, 1844) and colour variant *O. lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850).
1: specimen BT-5512; 2: specimen DG-3421; 3: specimen DG-4825; 4: specimen DG-7434; 5: specimen DG-4819; 6: specimen DG-2716; 7: specimen BT-4341; 8: specimen BT-6049; 9: specimen BT-1584; 10: specimen DG-7414; 11: specimen DG-4826; 12: specimen RF-0012; 13: specimen BT-1965; 14: specimen DG-1923; 15: specimen BT-5006; 16: specimen BT-5514; 17: specimen RF-0011.

5.3. Are the two shells different ?

The descriptions of *Oliva esiodina* Petuch and Sargent,1986 (non Duclos, 1844) and *Oliva lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850) are based exclusively on size and colour pattern.

5.3.1. Size.

PETUCH and SARGENT (1986) report for "*ePS*" a range of 15 to 25 mm and for "*lPS*" a range of 25 to 30 mm. In the sample examined here, the largest "*ePS*" had H = 25.79 mm (specimen BT-6049), the largest "*lPS*" H = 20.27 mm (specimen RF-0012) and the largest "*xPS*" H = 24.95 mm (specimen BT-0629).

In our opinion, absolute size is generally a poor criterion in *Oliva* taxonomy, as these shells frequently exhibit large variations on this character (see TURSCH & GERMAIN, 1985). Growth rates (expressed by H/pnw, D/pnw, etc ...) are more informative. On the basis of these characters also (see Table 3) we were unable to discriminate the groups.

5.3.2. Colour pattern :

The size of total sample examined is 44, consisting of 31 specimens with the characteristical "*ePS*" pattern shown in Fig. 1 (7-12), (all from Philippines), 6 specimens with the characteristical "*lPS*" pattern shown in Fig. 1 (1-6) (3 from Japan and 3 from Philippines) and 7 specimens with ambiguous patterns "*xPS*" (see paragraph 5.1) (1 from Japan and 6 from Philippines).

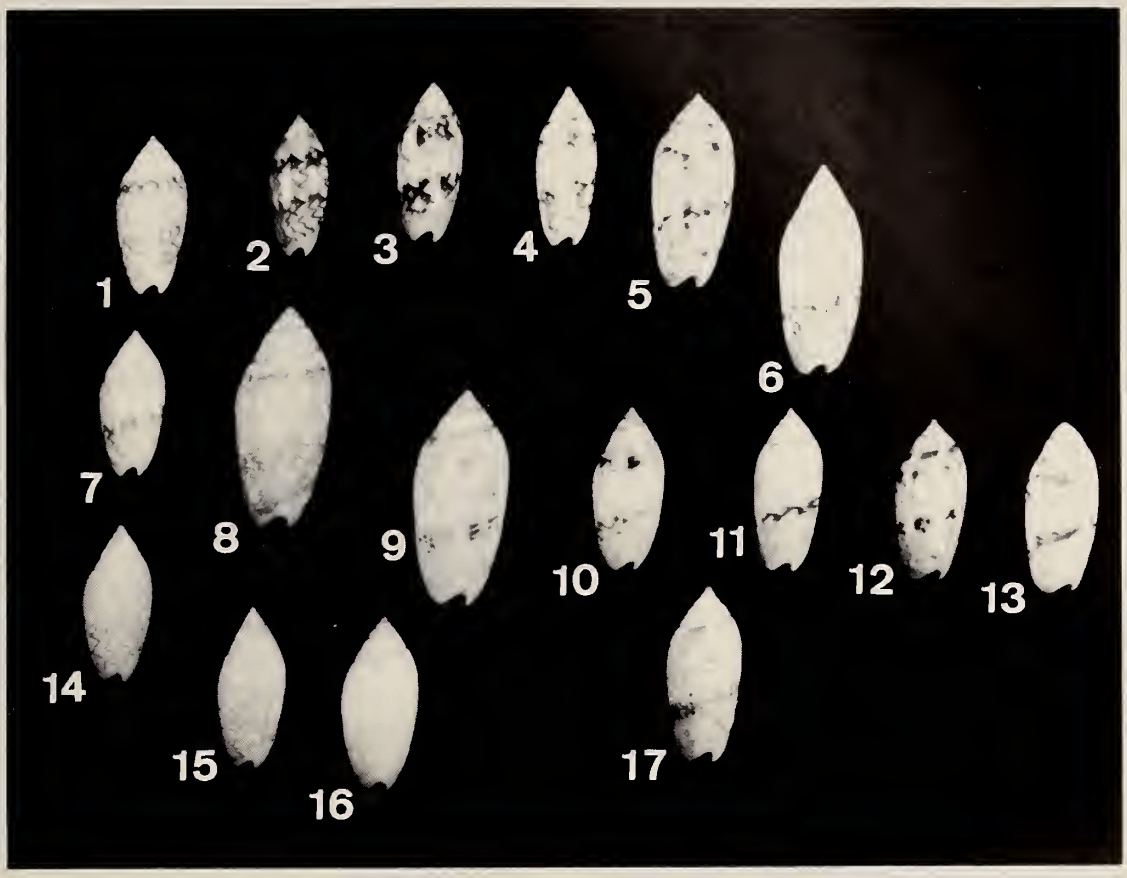
One can observe that in shells with "*ePS*" pattern (31 specimens) : 29 (93 %) have an unmarked subsutural band, 2 (6 %) have subsutural blotches on the body whorl and 7 (23 %) have subsutural blotches on the spire. In shells with "*lPS*" pattern (6 specimens) : 0 (0 %) have an unmarked subsutural band, 6 (100 %) have subsutural blotches on the body whorl and 6 (100 %) have subsutural blotches on the spire. In shells with ambiguous "*xPS*" pattern (7 specimens) : 0 (0 %) have an unmarked subsutural band, 7 (100 %) have subsutural blotches on the body whorl and 7 (100 %) have subsutural blotches on the spire.

One can see that specimens with the "*ePS*" pattern generally have a subsutural band devoid of pattern, whereas the "*xPS*" intergrades and the "*lPS*" have well marked blotches that actually reach the suture. This is only a general tendency as some specimens (for instance specimen DG-4825, illustrated Fig. 4,3) have both the "*ePS*" pattern and subsutural blotches on the body whorl. About one quarter of all "*ePS*" specimens have subsutural blotches on the spire.

It is rather frequent (16 % of all cases) to find shells presenting intermediate "***xPS***" colour patterns. Other, apparently uncorrelated pattern features are also found, such as puncticulations, one or two bands of darker pattern, etc .... No reliable difference could be found in the background colour.

Furthermore, a succession of the ***two patterns can be found on the same shell***, as for instance in specimens BT-6060, and DG-7128 (both from Subic Bay), illustrated in Fig. 5. This phenomenon can be directly observed only if it occurs on the body whorl (late in the life of the shell) but the frequent observation (23 % of all cases, see hereabove) of subsutural blotches on the spire of "typical" "*ePS*" shells suggests that such a change of pattern is frequent during growth.

Figure 5 (opposite page). *Oliva chrysoplecta* sp.n. Change of pattern on the same shell. 1 and 2: specimen DG-7128 (Holotype). 3 and 4: specimen BT-6060.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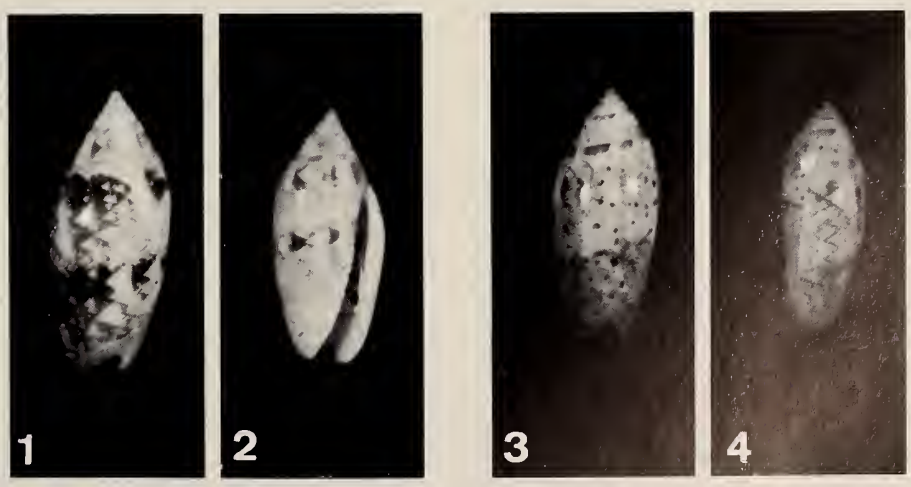
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In short, we failed to recognize any of the "consistently distinctive characteristics" of *Oliva esiodina* Petuch and Sargent,1986 (non Duclos, 1844).

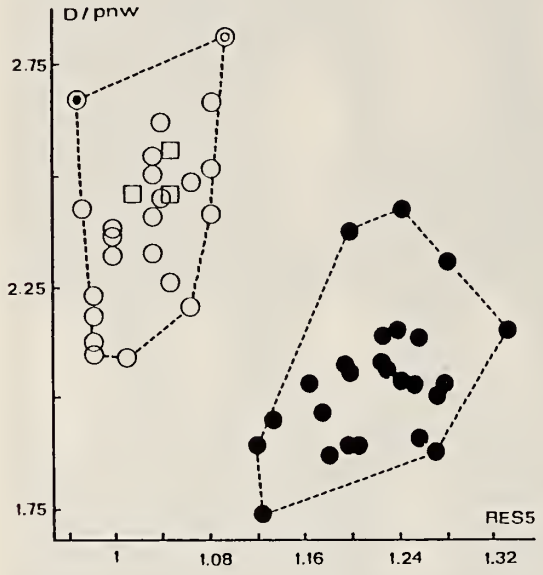

Figure 6. Comparison with *Oliva esiodina* Duclos. Scatter diagram of D/pnw *versus* res5. Black circles: *Oliva esiodina* Petuch and Sargent,1986 (non Duclos, 1844) and *Oliva lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850). White circles: *Oliva esiodina* Duclos, 1844. White squares: syntypes of *Oliva duclosi* Reeve, 1850. Concentric circles: syntype of *Oliva lentiginosa* Reeve, 1850. Dotted circle: syntype of *Oliva esiodina* Duclos, 1844.

5.3.3. Morphometric analysis of shape.

Computer-assisted search for univariate as well as bivariate discriminants failed to provide any significant character (or pair of characters) allowing an objective separation. Pattern and shell morphology are weakly correlated ,(as shown in Tables 1, 2 and 3) : a few characters (for instance D/L) do separate "*ePS*" from "*lPS*" but in every case the "*xPS*" intergrades always overlap both ranges.

This is supported by principal component analysis of the 21 specimens with intact protoconch on 16 characters : R/H, D/L, R/L, LW/L, X/L, (H-L)/L, sut/D, nw, lpro, (lpro-spro), res5, pat17, pat18, H/pnw, D/pnw and R/pnw (this list includes the most promising characters found by computer-assisted search for potential discriminants). On 3 principal axes, both the analysis of the correlation matrix, and that of the variances-covariances matrix show some correlation between colour pattern and shell morphology but fail to indicate the existence of clearly separate groups: clusters based upon colour pattern overlap to a large extent.

Very similar results were obtained with a series of 26 specimens on the 15 characters : R/H, H/L, D/L, R/L, LW/L, X/L, R/X, D/X, (H-L)/L, sut/D, sut/L, res5, H/pnw, D/pnw and R/pnw.

5.3.4. Findings.

All available evidence (analysis of colour patterns, morphometric data: uni- and bivariate analysis, principal components analysis) points in favour of a single, polymorphic species in which extreme colour forms can be strictly sympatric. This is the case for instance for specimens DG-7414 (Fig. 4,10), BT-6060 (Fig. 5,3-4) and BT-5511 (Fig. 2), all from Subic Bay, Luzon, Philippines.

This observation is not invalidated by the small size of the sample: increasing the number of specimens is very unlikely to erase the overlap already existing in small samples.

Formation of groups on the basis of localities rather than colour patterns gave equally negative results.

These shells, although familiar to *Oliva* students, appear to be unnamed. An excellent illustration of the "*ePS*" form is given (Card n 5489) by KAICHER (1988) who very wisely called it *Oliva* sp.

5.4. Comparison with related species.

Before deciding on the taxonomic rank of the "*ePS-lPS-xPS*" group of shells, one has to compare it to "related" species. We could think of no other than the "*O. panniculata*" group. The colour pattern of "*lPS*" form resembles that of some "*O. panniculata*" and some specimens of the "*ePS*" form are also vaguely reminiscent of the "*williamsi*" form. The shells are rather similar in size and gross shape (and have been placed by PETUCH and SARGENT in the same subgenus *Acutoliva*).

Table 1: comparison of teleoconch shape data.

	mean	standard error	95% confidence interval	coeff. of variability
H / L				
eps (n = 14)	1.36	0.043	1.27 - 1.44	3.19 %
xps (n = 7)	1.33	0.048	1.23 - 1.43	3.63 %
lps (n = 6)	1.30	0.025	1.25 - 1.35	1.91 %
D / L				
eps (n = 14)	0.62	0.014	0.59 - 0.65	2.30 %
xps (n = 7)	0.58	0.035	0.51 - 0.65	6.12 %
lps (n = 6)	0.56	0.014	0.53 - 0.59	2.52 %
X / L				
eps (n = 14)	0.51	0.013	0.48 - 0.54	2.51 %
xps (n = 7)	0.48	0.029	0.42 - 0.53	6.18 %
lps (n = 6)	0.46	0.011	0.44 - 0.49	2.43 %
R / L				
eps (n = 14)	0.38	0.017	0.34 - 0.41	4.43 %
xps (n = 7)	0.35	0.024	0.30 - 0.40	6.95 %
lps (n = 6)	0.33	0.014	0.30 - 0.36	4.24 %
LW / L				
eps (n = 14)	1.17	0.025	1.12 - 1.21	2.13 %
xps (n = 7)	1.15	0.025	1.10 - 1.20	2.18 %
lps (n = 6)	1.14	0.010	1.13 - 1.16	0.85 %
F / L				
eps (n = 14)	0.53	0.048	0.43 - 0.62	9.02 %
xps (n = 7)	0.47	0.022	0.43 - 0.52	4.66 %
lps (n = 6)	0.48	0.016	0.45 - 0.51	3.27 %
FG / L				
eps (n = 14)	0.56	0.063	0.44 - 0.69	11.19 %
xps (n = 7)	0.59	0.036	0.52 - 0.66	6.11 %
lps (n = 6)	0.59	0.021	0.55 - 0.63	3.52 %
(H-L) / L				
eps (n = 14)	0.36	0.043	0.27 - 0.44	12.16 %
xps (n = 7)	0.33	0.048	0.23 - 0.43	14.63 %
lps (n=6)	0.30	0.025	0.25 - 0.35	8.35 %

Table 1. The symbol *eps* stands for shells with the colour pattern of *Oliva esiodina* Petuch & Sargent, 1986 (non Duclos, 1844), *lps* for shells with the colour pattern of *Oliva lentiginosa* Petuch & Sargent, 1986 (non Reeve, 1850), *xps* for shells with ambiguous patterns. n indicates the size of the sample.

Table 2: comparison of protoconch data.

	mean	standard error	95% confidence interval	coeff. of variability
nw				
eps (n = 12)	3.38	0.066	3.24 - 3.51	1.95 %
xps (n = 5)	3.43	0.135	3.16 - 3.70	3.94 %
lps (n = 4)	3.54	0.048	3.44 - 3.63	1.35 %
spro				
eps (n = 12)	0.20	0.023	0.15 - 0.25	11.48 %
xps (n = 5)	0.20	0.014	0.17 - 0.23	7.07 %
lps (n = 4)	0.20	0.023	0.15 - 0.24	11.54 %
mpro				
eps (n = 12)	0.37	0.023	0.32 - 0.42	6.36 %
xps (n = 5)	0.38	0.012	0.36 - 0.40	3.19 %
lps (n = 4)	0.37	0.006	0.36 - 0.39	1.63 %
lpro			l	
eps (n = 12)	0.58	0.024	0.53 - 0.63	4.11 %
xps (n = 5)	0.60	0.022	0.56 - 0.65	3.65 %
lps (n = 4)	0.60	0.018	0.56 - 0.63	2.95 %
res4				
eps (n = 12)	0.75	0.046	0.66 - 0.84	6.11 %
xps (n = 5)	0.76	0.065	0.63 - 0.89	8.56 %
lps (n = 4)	0.77	0.049	0.67 - 0.87	6.40 %
res5				
eps (n = 12)	1.19	0.048	1.09 - 1.29	4.05 %
xps (n = 5)	1.24	0.046	1.15 - 1.33	3.70 %
lps (n = 4)	1.25	0.025	1.20 - 1.30	2.00 %
pat14				
eps (n = 12)	0.20	0.033	0.13 - 0.27	16.63 %
xps (n = 5)	0.21	0.043	0.13 - 0.30	19.99 %
lps (n = 4)	0.20	0.021	0.16 - 0.25	10.37 %
pat16				
eps (n = 12)	0.35	0.031	0.29 - 0.41	8.75 %
xps (n = 5)	0.33	0.036	0.26 - 0.40	10.84 %
lps (n = 4)	0.35	0.019	0.31 - 0.39	5.37 %
pat17				
eps (n = 12)	0.64	0.082	0.48 - 0.80	12.70 %
xps (n = 5)	0.66	0.061	0.53 - 0.78	9.24 %
lps (n = 4)	0.70	0.045	0.61 - 0.79	6.37 %
pat18				
eps (n = 12)	0.95	0.120	0.71 - 1.19	12.62 %
xps (n = 5)	1.00	0.157	0.69 - 1.31	15.70 %
lps (n = 4)	0.98	0.017	0.95 - 1.02	1.76 %

Table 2. The symbol *eps* stands for shells with the colour pattern of *Oliva esiodin*a Petuch & Sargent, 1986 (non Duclos, 1844), *lps* for shells with the colour pattern of *Oliva lentiginosa* Petuch & Sargent, 1986 (non Reeve, 1850), *xps* for shells with ambiguous patterns. n indicates the size of the sample.

Table 3: comparison of growth pattern data.

	mean	standard error	95% confidence interval	coeff. of variability
(log H) / pnw				
eps (n = 14)	0.70	0.021	0.66 - 0.74	3.01 %
xps (n = 7)	0.71	0.029	0.65 - 0.77	4.03 %
lps (n = 5)	0.73	0.008	0.71 - 0.74	1.05 %
(log D) / pnw				
eps (n = 14)	0.51	0.019	0.47 - 0.55	3.69 %
xps (n = 7)	0.51	0.016	0.48 - 0.54	3.13 %
lps (n = 5)	0.52	0.004	0.51 - 0.53	0.84 %

Table 3. The symbol *eps* stands for shells with the colour pattern of *Oliva esiodina* Petuch & Sargent, 1986 (non Duclos, 1844), *lps* for shells with the colour pattern of *Oliva lentiginosa* Petuch & Sargent, 1986 (non Reeve, 1850), *xps* for shells with ambiguous patterns. n indicates the size of the sample.

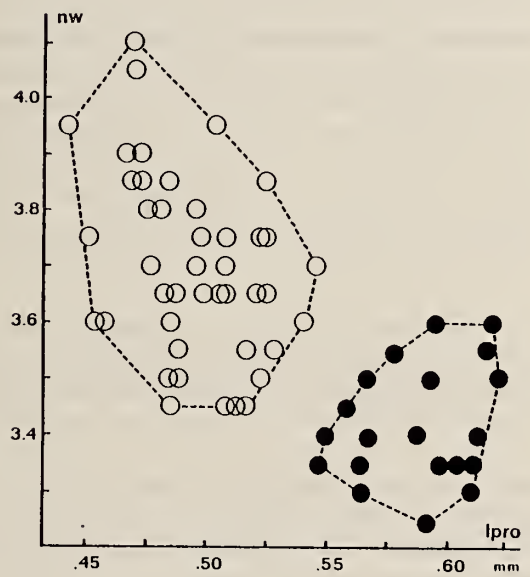

Figure 7. Comparison of *Oliva chrysoplecta* sp.n. (black circles) with *O. panniculata* (*sensu lato*) (white circles). Scatter diagram of lpro versus nw.

Many names have been given to shells belonging to the "*O. panniculata*" group. It appears to be quite complex and variable (unpublished data) and its study is not the object of the present paper. Let us simply notice at this point that in this case also, very different colour forms can be found at a single locality (for instance in Kwajalein or in the Solomon Islands). Awaiting a much needed objective revision of the "*O. panniculata*" complex, we can nevertheless use it as a whole for comparison purposes.

Computer-assisted search for operational discriminant characters readily yields a number of suitable separations. An example of such separation is given in Figure 7. It gives convincing evidence that the "*ePS-lPS-xPS*" shells are distinct from the "*O. panniculata*" group as a whole.

5.5. Taxonomic rank.

All the "*O. panniculata*" we have seen from the Philippines or from Okinawa were shown to be the "*lPS*" or "*xPS*" forms studied hereabove and we have no evidence of sympatric occurence. Decisions on specific vs. subspecific rank for allopatric phena are inherently delicate. In this case we consider that the magnitude of the morphological gap justifies specific rank for the "*ePS-lPS-xPS*" phenon.

6. CONCLUSIONS.

a. *Oliva esiodina* Petuch and Sargent, 1986 is demonstrably different from *Oliva esiodina* Duclos, 1844.

b. *Oliva lentiginosa* Petuch and Sargent, 1986 is demonstrably distinct from *Oliva lentiginosa* Reeve, 1850.

c. *Oliva esiodina* Petuch and Sargent,1986 (non Duclos, 1844) and *Oliva lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850) are intergrading variants of the same, variable species.

d. This shell is distinct from the allopatric "O. *panniculata*" group and appears to deserve specific rank.

e. This shell is unnamed: a new name has to be coined to replace both *Oliva esiodina* Petuch and Sargent, 1986 (non Duclos, 1844) and *Oliva lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850).

7. DESCRIPTION.

In the absence of any available name, we call this shell *Oliva chrysoplecta*, sp.n. The name derives from the Greek and means "gold braided", in reference to the colour pattern of the common Philippine form.

7.1. General aspect.

This subovate to biconic *Oliva* shell is of small size (17 to 26 mm) with an average breadth to length ratio of 0.45 (0.40 to 0.48). The exserted spire has a conical profile and an average height of 27 % of the total shell length. The protoconch is small and pointed. The suture is narrow. The aperture is narrow. The inner lip has about 11 distinct callus plaits. The upper margin of the fasciolar band meets the inner lip at an average 36 % of the total shell length (50 % of the lip length). The outer lip is rounded and solid but not very thick. In contrast to *Oliva esiodina* Duclos, the outer lip is not parallel to the shell axis but rather parallel to the inner lip.

7.2. Colour pattern.

The ground colour of the shell is whitish to cream, as seen in the aperture. In some specimens, the aperture has an axial brown band, in some others two or more grey-brown blotches are present on the inner margin of the outer lip. The colour pattern of all shells of the species has a rather light overall aspect.

Most specimens of the new species can be assigned to one of the two main colour forms "*ePS*" or "*lPS*". It is important to remember that intergrading specimens "*xPS*" are not unfrequent and prove the conspecificity of both colour forms. For easier reference, the "*ePS*" colour form (*Oliva esiodina* Petuch and Sargent,1986 (non Duclos, 1844)) (Fig.1, 7 to 12, and Fig. 2, 7 to 12) could called the "reticulate colour form" and the "*lPS*" colour form (*Oliva lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850)) (Fig. 1 ,1 to 6, and Fig. 2, 1 to 6) the "spotted colour form".

In both colour forms the smallest pattern units are minute V-shaped brown spots ("micro-chevrons") of about 0.2 mm, opening in the shell growth direction.

In the reticulate colour form ("*ePS*") these "micro-chevrons" coalesce into longer strokes of several millimeters. Under magnification these strokes often show a "hairy" or "thorny" appearance, due to the unjoined legs of the "micro-chevrons". These larger strokes build the usual larger V-shaped chevrons of some millimeters, also opening in the shell growth direction and with the "hairs" or "thorns" of the "micro-chevrons" always directed to the inside of the V.

The larger chevrons join to form axial ziczac lines. These can either run more or less parallel to each other (forming a pattern reminiscent of that seen at the surface of glaciers) or they can contact each other (giving a mirror image impression) and build a meshwork of many rhombs. In every case, the pattern of the reticulate colour form ("*ePS*") of *Oliva chrysoplecta* is one of the finest, neatest and most distinct amongst all *Oliva* species.

The last whorl of adult specimens generally has a 1 to 2 mm subsutural zone nearly devoid of any kind of pattern, whilst the earlier whorls of the spire show the subsutural markings found on the body whorl of the spotted colour form ("*lPS*"). The fasciolar band is nearly unmarked, except for some faint comma-like strokes.

In the spotted colour form ("*lPS*") the "micro-chevrons" form a very faint and minute "tent pattern". Some of the "micro-chevrons" are much more pigmented, giving the pattern a puncticulate appearance. This small pattern is arranged into a larger ten-mark pattern with the tops of the white triangular "tents" of all sizes pointing in the shell growth direction. One can also translate this by saying that between two converging brown lines the shell surface is always white, whilst the surface between diverging brown lines can be filled with minute brown tent-marks or with diffuse axial brown zones.

A subsutural pattern formed of purplish-brown blotches, (somewhat resembling that of *Oliva paniculata* Duclos) and sometimes shaped like a bird wing regularly occurs in this form, including on the body whorl, in contrast to the reticulate colour form ("*ePS*"). The pattern of the body whorl reaches up to the subsutural markings, leaving no empty spiral zone (as it is the case in the reticulate colour form ("*ePS*"). The fasciolar band contains more comma-like and wavy lines as in the other form. An abapical spiral zone in which the pattern is darker and more contrasted is always present, a similar shoulder band is occasional.

7.3. Numerical data.

The "aesthetical" description hereabove respects the classical tradition of conchology. As usual, it is of limited utility because nearly every adjective is open to personal interpretation. In order to allow objective comparison with other taxa, the observed variation range of *Oliva chrysoplecta* is given in Table 4.

7.4. Type material of *Oliva chrysoplecta*, sp.n.

Holotype: specimen DG-7128, Fig. 5 (1 and 2), deposited at the Institut Royal des Sciences Naturelles de Belgique, Brussels, under the number I.G.27547 (holotype n° 447).

H = 17.9, L = 13.0, D = 7.9 mm.

Paratype 1: specimen BT-1160, Figs. 2 (11) and 2(11), deposited at the Muséum National d'Histoire Naturelle, Paris. H = 17.0, L = 12.7, D = 7.9 mm.

Paratype 2: specimen BT-1159, Figs. 2 (12) and 2(12), deposited at the British Museum (Natural History), London. H = 18.0, L = 13.6, D = 8.3 mm.

Paratype 3: specimen BT-1157, Figs. 2 (4) and 2(4), deposited at the British Museum (Natural History), London. H = 20.1, L = 15.7, D = 8.4 mm.

Paratype 4: specimen DG-1780, Figs. 2 (10) and 2(10), in the Dietmar Greifeneder collection, Villingen-Schwenningen. H = 17.0, L = 12.0, D = 7.5 mm.

Paratype 5: specimen BT-5511, Figs. 2 (7) and 2(7), in the Bernard Tursch collection, Brussels. H = 17.9, L = 12.9, D = 7.8 mm.

Paratype 6: specimen R28117 (not figured), Instituto Português de Malacologia. H = 13.75, L = 10.48, D = 6.49 mm.

7.5. Distribution.

The colour forms "*lPS*" (spotted) and "*xPS*" (intergrades) are both found in Okinawa. All three forms "*lPS*" (spotted), "*ePS*" (reticulate) and "*xPS*" (intergrades) are found in the Philippines, with an apparent predominance of "*ePS*" (co-occuring with "*xPS*" intergrades) in Luzon.

Although the colour form "*ePS*" (reticulate) appears indeed to be a local colour variant we consider it is unwise to erect a subspecies on the sole basis of colour pattern in a genus where this character is notoriously variable.

8. DISCUSSION.

Oliva esiodina Petuch and Sargent,1986 (non Duclos, 1844) and *Oliva lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850) are synonyms for the same shell just as *Oliva esiodina* Duclos, 1844 and *Oliva lentiginosa* Reeve, 1850 are synonyms for another shell. Is this just an amusing coincidence or does it tell us something about the variability of some *Oliva* colour patterns and the way it is perceived by us ?

The variability of *Oliva chrysoplecta* is particularly apparent in its coulour pattern : this should not be surprizing as similar situations are familiar (and appear to raise no comment) in the cases of *Oliva miniacea*, *O. flammulata*, *O. bulbosa* and many other *Oliva* shells.

Table 4: variation range of *Oliva chrysoplecta*, sp.n.

character	mean	standard error	95% confidence interval	coeff. of variability
Protoconch :				
nw (n = 21)	3.42	0.102	3.22 - 3.62	2.98 %
spro (mm) (n = 21)	0.20	0.020	0.16 - 0.24	10.17 %
mpro (mm) (n = 21)	0.37	0.019	0.33 - 0.41	5.10 %
lpro (mm) (n = 21)	0.59	0.024	0.54 - 0.64	4.05 %
res4 (mm) (n = 21)	0.76	0.049	0.66 - 0.86	6.52 %
res5 (mm) (n = 21)	1.21	0.051	1.11 - 1.32	4.18 %
pat14 (mm) (n = 21)	0.20	0.033	0.14 - 0.27	16.05 %
pat16 (mm) (n = 21)	0.35	0.031	0.28 - 0.41	8.85 %
pat17 (mm) (n = 8)	0.66	0.072	0.51 - 0.80	11.02 %
pat18 (mm) (n = 21)	0.97	0.116	0.74 - 1.20	11.97 %
Shape of Teleoconch :				
H / L (n = 27)	1.34	0.047	1.24 - 1.43	3.49 %
D / L (n = 27)	0.59	0.032	0.53 - 0.66	5.43 %
X / L (n = 27)	0.49	0.027	0.44 - 0.54	5.45 %
R / L (n = 27)	0.36	0.026	0.31 - 0.41	7.28 %
LW / L (n = 27)	1.16	0.023	1.11 - 1.20	2.01 %
F / L (n = 27)	0.50	0.045	0.41 - 0.59	8.88 %
FG / L (n = 27)	0.58	0.051	0.47 - 0.68	8.77 %
(H - L) / L (n = 27)	0.34	0.047	0.24 - 0.43	13.91 %
Growth of Teleoconch :				
(log H) / pnw (n = 26)	0.71	0.023	0.66 - 0.75	3.32 %
(log D) / pnw (n = 26)	0.51	0.016	0.48 - 0.54	3.20 %

Size :

Largest specimen measured: specimen BT-6049 (Philippines, Sulu Sea).
pnw: 4.85; H: 25.79 mm; L: 18.90 mm; D: 11.52 mm; X: 9.35 mm; R: 7.27 mm.

Smallest specimen measured: specimen BT-4340 (Philippines, Luzon, Manila Bay).
pnw: 3.85; H: 15.74 mm; L: 12.22 mm; D: 7.80 mm; X: 6.33 mm; R: 4.37 mm.

Table 4. The size of the available sample depends on the state of the specimens (mainly on protoconch damage) and is indicated by n.

9. MATERIAL MEASURED.

BMNH refers to specimens from the British Museum (Natural History), London; MNHN to specimens from the Muséum National d'Histoire Naturelle, Paris, IPM to specimens from the Instituto Português de Malacologia. DG- numbers refer to the Dietmar Greifeneder collection, RF-numbers to the Ralph Duchamps collection, BT-numbers to Bernard Tursch collection. The symbol (+) indicates the presence of an intact protoconch, (+/-) of a partially damaged protoconch still allowing some measurements, (-) of a completely damaged protoconch. Numerous additional shells have been examined but not accurately measured; they are not listed hereunder.

MATERIAL DESCRIBED.

Oliva chrysoplecta, sp.n.

1. Reticulate colour form (*O. esiodina* Petuch and Sargent,1986 (non Duclos, 1844)) (refered to as "*ePS*" in the text) :

PHILIPPINES. Luzon Island. Magalawan, 8 ft. sand: BT-1159 (+)(paratype 2), BT-1160 (+)(paratype 1), DG-3421 (+); Manila Bay: BT-4340 (+), BT-4341 (+), IPM-R28117 (+) (paratype 6); Subic Bay: BT-5006 (+), BT-5510 (+), BT-5511 (+)(paratype 5), BT-5512 (+), BT-5514 (+), DG-1780 (+)(paratype 4), DG-1923 (+), DG-4825 (+/-); Sulu Sea: BT-6049 (+/-).

2. Spotted colour form (*O. lentiginosa* Petuch and Sargent,1986 (non Reeve, 1850)) (refered to as "*lPS*" in the text) :

JAPAN. Okinawa, Onna Channel: BT-1157 (+)(paratype 3), BT-1158 (+), DG-4826 (+).

PHILIPPINES. Palawan: RF-0011 (+/-), RF-0012 (+); Sulu, Siasi I.: BT-1965 (-).

3. Intermediate colour forms (refered to as "*xPS*" in the text).

JAPAN. Okinawa, Onna Channel: DG-4819 (+),

PHILIPPINES. Luzon Island. Subic Bay: BT-6060 (+), DG-7128 (+) (holotype), DG-7414 (+); Masbate: DG-2716 (+/-), DG-7434 (+); no locality: BT-0629 (+/-).

MATERIAL USED FOR COMPARISON.

Type material :

Oliva esiodina Duclos: figured syntype, MNHN (+/-), "Iles de l'Océanie".

Oliva duclosi Reeve: 3 syntypes, BMNH-1987006/b (+/-) BMNH-1987006/c (+/-), BMNH-1987006/a (+/-). "Philippine Islands (Isle of Luzon + Society Islands)".

Oliva lentiginosa Reeve: 2 syntypes, BMNH-1892.9.24.2 (+/-), BMNH-1892.9.24.3 (-), locality unknown.

Oliva esiodina Duclos, 1844:

TAHITI. Arue, 3 m, black sand: DG-1728/b (+); Hitiaa, 1 m, black sand: DG-1731/b (+); 3 m, black sand: DG-1731/c (+); 6m, sand: DG-1730/a (+), DG-1730/B (+); Mahina, 15-25 ft, black sand: BT-4672 (+/-), BT-4673 (+/-), BT-4674 (+/-), BT-4675 (+/-); Matavai Bay, black sand: BT-5298 (+/-), BT-6045 (+/-), BT-6046 (+/-), BT-6047 (+/-), BT-6048 (+/-); Pirae: BT-3686 (+/-), BT-3687 (+); No locality: BT-3688 (+/-), BT-6038 (+), BT-6042 (+/-), BT-6043 (+/-), BT-6044 (+/-).

Oliva panniculata Duclos, 1835 (*sensu lato*) :

FIJI. Rotuma I. BT-5123 (+).

INDONESIA. Bali: BT-0723 (+), BT-1999 (+), BT-2000 (+), BT-2001 (+), BT-2002 (+).

MARQUESAS IS. Hiva Hoa: BT-0696 (+)(f. *williamsi* ?); No locality: BT-0699 (+)(f. *polita* ?), BT-6051 (+)(f. *polita* ?), BT-6052 (+)(f. *polita* ?), BT-6053 (+)(f. *polita* ?).

MARSHALL Is. Kwajalein: BT-2802 (+), BT-2803 (+), BT-2805 (+), BT-2807 (+), BT-2810 (+), BT-2815 (+)(f. *williamsi* ?), BT-2817 (+)(f. *williamsi* ?), BT-2818 (+)(f. *williamsi* ?), BT-2819 (+)(f. *williamsi* ?), BT-2820 (+)(f. *williamsi* ?).

MAURITIUS I. Cargados Carajos: BT-4458 (+); Port Louis: BT-4339 (+); No locality: BT-0700 (+), BT-0701 (+), BT-2903 (+), BT-5717 (+).

PAPUA NEW GUINEA. Hansa Bay: BT-5314 (+), BT-5314 (+).

REUNION I. No locality: BT-4797 (+), BT-4894 (+), BT-4990 (+), BT-4993 (+), BT-6050 (+).

SOLOMON Is. Guadalcanal, Honiara: BT-4331 (+), DG-4702/2 (+), DG-4702/5 (+), DG-4702/10 (+), DG-4702/11 (+)(f. *williamsi* ?), DG-4702/12 (+)(f. *williamsi* ?) ; Marau Sound: BT-4336 (+); No locality: BT-4333 (+), BT-4334 (+); Malaita: BT-2489 (+)

TONGA. Vava'u: BT-4456 (+).

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REFERENCES.

DUCLOS, P.L., 1844. *Oliva.* in J.C. CHENU, Illustrations conchyliologiques, 31 pp., Paris.

KAICHER, S.D., 1988. Card catalogue of worldwide shells. Pack 51: Olividae Part 2. St.Petersburg, Florida.

PETUCH, E.J. & D.M. SARGENT, 1986. Atlas of the Living Olive Shells of the World. 253 pp. Coastal Education and Research Foundation, Charlottesville, Virginia.

REEVE, L. 1850. Conchologia iconica or illustrations of the shells of molluscous animals. Monograph of the genus *Oliva*, pls. 1-30, London.

TURSCH, B. & L. GERMAIN, 1985. Studies on Olividae. I. A morphometric approach to the *Oliva* problem. *Indo-Malayan Zoology*, 2: 331-352.

TURSCH, B. & L. GERMAIN, 1986. Studies on Olividae. II. Further protoconch morphometrical data for *Oliva* taxonomy. *APEX* 1(2): 39-45.

TURSCH, B. & L. GERMAIN, 1987. Studies on Olividae. V. Five additional protoconch characters for *Oliva* taxonomy. *APEX* 2(3-4): 59-68.

TURSCH, B. & D. GREIFENEDER, 1989. Studies on Olividae. X. The taxonomic status of *Oliva esiodina* Duclos, 1844, *O. duclosi* Reeve, 185O and *O. lentiginosa* Reeve, 1850. *APEX*, 4(4): 57-68.